

Postal Vehicles Start Rolling Off Assembly Line

MONTGOMERY, Pa., April 15, 1987 — Just 12 months and a week ago, Grumman signed a billion dollar contract with the U.S. Postal Service. Today, 250 Grummanites and a number of program consultants, watched as Allied President Ron Peterson started the engine of the first production Long Life Vehicle (LLV) and drove it off the end of the assembly line. Grumman will build 99,149 more LLVs over the next five and a half years.

"We've come a long, long way," Peterson told the Grummanites as they gathered around the first production vehicle. "Many people have done a lot of hard work to help get us where we are today — especially all of you folks in the room here. We're going to have a good, long program."

"This did not happen through miracles," said Kip Towl, Allied's LLV division president. "This happened through your hard efforts. Let's keep it rolling."

The Postal Service will officially accept the first six production units at a ceremony scheduled for April 29 at its Washington, D.C. headquarters. The first LLV will go to work at the Service's Management Sectional Center in Merrifield, Virginia.

Grumman will deliver 50 LLVs this month. The number of LLVs delivered each month will increase until a full production rate of 95 LLVs a day is reached in October.

The pressure of deadlines is constant. There hasn't been time to stand still and admire the LLV. "A week ago we worked more than 24 hours straight to finish the first article," said Ed Sober, an assistant foreman. That had to be ready for the Postal Service inspectors on Tuesday, April 7. "I went home at 9:30 the next morning."

Postal Service inspectors decided the LLV made up of 500-plus parts was perfect. "I'm extremely happy with the product we're getting and with the efforts of the Grumman people — especially those here in Montgomery," said Jerry Kerr, of the Postal Service's office of Fleet Management. "They've done an outstanding job of getting us this vehicle on schedule."

Right now, Grummanites at Montgomery are learning the various jobs on the 40 stations of the production line. "I can't wait until we're running at full rate," said Sean Conahan, who programs the robots that will paint the LLV bodies. "It's going to be such a change from what we had been doing." Until the LLV program, Montgomery had been one of the Olson truck body manufacturing sites.

Putting together the basically custom-built Kurbmasters was art;



the LLV production process is science and technology. Every part must fit perfectly. There's no time for hand-finishing; every six minutes a vehicle will move to the next work station.

"There are still some bugs to be worked out, but we'll get it down," said Sober. He and several others were working on a heater in the second LLV scheduled for delivery today. As they work, the vehicle is being towed along by a conveyor chain under the floor.

Other Grummanites here are fine-tuning the carousels. These are production line units where detail parts are painted or assembled or where the bodies are completed. "It looks like an amusement park," said Maxine Smith, who works in the subassembly area.

"We're staying ahead of the problems and even when we don't have problems, we go looking for them," said Towl. "The schedule is tight, but we're going to make it." ■

Special Delivery. The Grummanites in Montgomery, Pennsylvania, celebrated the completion of the first production Long Life Vehicle (above). The vehicle on the right is the first article, the standard by which all production units will be judged. Joining Grumman Allied President Ron Peterson (below, R) to celebrate the occasion were (L to R) Dave Letts, the Postal Service's contracting officer; Jerry Kerr, the Postal Service's procurement program manager, and Larry Parsons, LLV Division vice president. (Photos by Rich Breunig)



Dividend Declared; Appointments Made

On April 16, the Grumman board of directors declared a dividend of 70 cents per share on the company's \$2.80 preferred stock payable May 15, 1987, to shareholders of record at the close of business on May 5, 1987. The directors also declared a dividend of 25 cents per share on common stock payable May 20, 1987, to shareholders of record at the close of business on May 8, 1987.

The board also announced new posts for several Grummanites.

In *Data Systems*, Joe DiGiacomo was appointed vice president-controller. Stuart Steele is the division's new vice president of Engineering.

In *Electronics Systems*, Charles Esposito was appointed vice president-Guided Weapons Systems. Esposito retains his duties as program vice president for the Intermediate Forward Test Equipment contract.

In *Space Systems*, Jerry Goldmacher was named program vice president-Space Station.

The board also approved the election of Jack Latterner as vice president of Marketing for Grumman Credit Corporation.

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Grumman Hosts Chinese, Pakistanis For Aircraft Study

WOODBURY, New York — In Grumman's Building 45 here, you can overhear business going on in three languages.

Grummanites, Chinese engineers and Pakistani Air Force officers are studying the technical feasibility of equipping the Chinese-built F-7M fighter with a U.S. engine and avionics. The aircraft would replace Pakistan's Chinese-built F-6 fighter and has been dubbed the Sabre II.

"This is a very early phase in this program," says Bob Roemer, study program director. "We are helping the Pakistanis determine if it can be done at a price they can afford. We're studying what must be done structurally to do the modifications the Pakistanis want. Later on, we'll do a cost analysis, including life cycle costs such as logistic and technical support."

Pakistan's current fighters are the F-6, the General Dynamics F-16 and the French Mirage. The F-7M, an upgraded version of the F-7, was designed by the Chinese for foreign sales.

"Pakistan is interested in the aircraft, but wants an American engine and electronics," says Roemer. "The Chinese know that we can't just give these items to them to install. According to DoD foreign military sale regulations, there has to be a U.S. company involved in modifying the aircraft to Pakistan's requirements."

Since only one F-7M was ever produced — a prototype — the Sabre II program would involve manufacturing brand-new airframes. The Pakistanis have said they want a fleet of 150.

Under a proposed arrangement, the Chinese would build the aft and wing sections of the plane, which would encompass any modifications necessary for mating American engines. An American firm would build the forward section, including the cockpit and electronics. The Pakistanis would join these sections and install the engines and electronics.

The Chinese represent the Chengdu Aircraft Corporation, named for the city in the Szechuan province where the company is located. "The Chinese are here to provide consultation on the current F-7M aircraft configuration, while the Pakistanis give us input on their requirements," says Roemer.

There are now eight Chinese and four Pakistanis working on the program, as well as about 30 Grummanites. Different technical disciplines will be needed at different times during the study; hence, additional Chengdu engineers will join the program, while some of the current ones will go home.

A linguist will stay for the duration of the program, to serve as an interpreter. While the Chinese can read it fairly well, they have trouble conversing in English. The linguist is helped by a Grumman engineer who speaks Mandarin Chinese. The Pakistanis, on the other hand, speak English fluently.

Another Pakistani officer will join the team next month. At the peak of the study effort, there will be about 40 Grummanites involved.

It's too early to tell if future work for Grumman will result from the study, since there are a lot of hurdles ahead. "At any time in the study, the team could determine that it's just not technically feasible," notes Roemer. "Or, we might find that it's just not producible at an affordable price."

The study will end in late July or early August. After that, Pakistan will issue a request for proposals for full scale development. This phase would include building several Sabre II prototypes.

Grumman is involved with both China and Pakistan on several other programs. Pakistan is considering the E-2C Hawkeye, among other aircraft, to fill its airborne early warning requirements. Grumman Emergency Products is negotiating a joint venture with China Fire Protection Equipment Corporation, in which a Grumman-designed fire truck would be built in China. ■



International Venture. (L-R) Huang Qingxiang, chief systems designer, Chengdu Aircraft Corporation; Wing Cdr. Asghar, Pakistan Air Force; Wing Cdr. Shoib Ahmed, Pakistan Air Force; and Larry Kipmic, Grumman avionics project engineer, study a model of the Chinese-built F-7M. The plane may become Pakistan's next-generation fighter. (Photo by Rich Breunig)

Computerization Supercharges Veteran Wind Tunnel Facility

FARMINGDALE, Long Island — On April 6, Grumman Vice Chairman of Technology Will Bischoff officially opened the company's newly upgraded high speed wind tunnel complex here. The company has invested \$1.5 million to modernize the facility with advanced data handling and measurement systems.

"This is a major improvement in data acquisition," said Bischoff. "We now can get more data, and much better data."

There are three wind tunnels in the complex: hypersonic, supersonic and transonic. The hypersonic wind tunnel is capable of blowing air past a model at 10 times the speed of sound. The transonic and supersonic tunnels are used constantly for new projects such as the F-14D and the A-6F, or when a customer wants to hang a new missile on the wings of its current family of Grumman planes.

Grumman bought the wind tunnel facility from Fairchild Republic in the late '50s. "Sadly, the system that we depended on for over 20 years had become very user unfriendly," said Jim Healy, acting group head of Science Data in Flight Test.

The ancient system of gauges, switches and measurement devices that controlled the wind tunnels and extracted data from the models was outmoded. Control panel lights would blink mysteriously. The system developed an appetite for punch cards, cards that engineers had to spend a lot of time producing in order to set up wind tunnel tests.

"We were losing almost 30 hours a month with the old system," said Aero Test section head Fritz Blombach. "We were constantly fixing it. The manufacturers no longer made parts for it."

A new test could be programmed only after one was finished. Test results were just raw numbers reproduced in three-inch thick printouts. Engineers, poring through those printouts, penciled dots on graph paper in order to plot the results.

"I used to dread hand-plotting data," said Aero Test engineer Steve Malusa.

Behind him, his new computer screen displayed several overlaid graphs. With all the tiny squares and triangles and lines curving through them, the image looked like a picture of the right half of a tree in full bloom. "It used to take us a half-day to plot data. With the new system it takes three to four minutes," Malusa said.

The design team built a flexible, powerful system. Using the same kind of hardware and much of the basic software that was developed for the recently modernized low-speed wind tunnel in Bethpage saved Grumman between one-half and three-quarters of a million dollars.

It will save even more in time and labor. While data are analyzed from a previous test, a new test can be run and another prepared. Some 20 tasks can be done simultaneously. It even handles the paperwork through its office automation capabilities.

Unit Values

The Grumman Employee Investment Plan has reported the following unit values as of February 28, 1987 (compared to January 31, 1987 figures):

Equity Fund
4.427 up from 4.166

Fixed Income Fund
5.857 up from 5.822

Guaranteed Income Fund
2.448 up from 2.429

Company Stock Fund
\$30.63 up from \$27.63

Note: It usually takes several weeks to formulate these values. EIP members can call Ext. (111) 54400 (outside Grumman, call 516-575-4400), for a recorded message which is made as soon as the new unit values are available.

Check Your Pressure

May is National Hypertension Month.

Hypertension can exist for years without symptoms. It's wise to periodically have your blood pressure checked.

Every Monday, Wednesday and Friday in May, Grummanites can have their pressure checked by company nurses. Free check-ups will be given during lunch at all company cafeterias and buffeterias.

Pamphlets about hypertension will also be available at that time. For more information, call Ada Colter, Ext. (111) 53723.



A Worthwhile Investment. At the recent EIP annual meeting, Grumman Vice President and Secretary Bob Bradshaw outlined the performance of the four company investment vehicles over the past year. (Photo by Bob Sagliocca)

Investment Plan '86: Continued Health, But New Tax Law Affects Some Members

The Grumman Employee Investment Plan (EIP) was a good place to invest your money in 1986 — for long-term gain, that is.

The plan's performance in '86 was detailed at the annual EIP meeting, held April 2 in Grumman Headquarters. Investors in the equity, fixed income, and guaranteed income funds earned healthy returns while the company stock fund ended the year on a down note.

However, 1986 was also the year of tax reform. The new law, which went into effect at the beginning of 1987, makes it more difficult to withdraw deferred compensation option (DCO) funds and penalizes withdrawals of regular EIP contributions deposited after January 1, 1987.

"Congress intends to make these kinds of plans more retirement-supplement vehicles, and less of a savings account," said Bob Bradshaw, Grumman Corporation vice president and secretary and a member of the EIP committee. "When it authorized EIPs, Congress didn't envision that their primary purpose would be to buy televisions and automobiles."

The new law discontinued the Payroll Based Stock Ownership Plan (PAYSOP), though Grummanites' accounts existing as of December 31, 1986, remain open and active. Tax reform also changed the percentage of income some people can contribute to their DCO accounts. Under the old rules, Grummanites in the top one-third income group could put seven percent of their income in this tax-deferred, retirement savings plan, while the limit for the lower two-thirds was 14 percent.

Under the new rules, the top bracket has been redefined, resulting in the top 10 percent of Grummanites falling into this category. Consequently, more people will be able to defer 14 percent. Also, since the IRS still bases the upper bracket's allowable contribution on the lower group's par-

ticipation rate, the seven percent may increase.

The new tax law didn't dampen the performance of the equity and fixed income funds in 1986. They benefitted from continued health on Wall Street.

"Both the stock and bond markets enjoyed an extraordinary year in 1986," said Grumman Assistant Treasurer Bill Parmentier. "Together, 1985 and 1986 represent only the third two-year period in the 20th Century in which the market hasn't had a 10 percent or greater decline."

The equity fund offered a 20 percent return last year, ahead of the Standard and Poors 500 (18.7 percent) but trailing the Dow Jones Industrial Average (27.3). Those are the two leading indexes of performance among major stocks. The 1986 SEI median was 16.7 percent. SEI, Inc., is a stock-information company that surveys money managers and calculates an average return.

Management of the equity fund was switched mid-year, from Fiduciary Trust to First Manhattan Capital Management. The fund gained about .5 percent during a period in which the Standard and Poors 500, overall, fell almost 2 percent. That exceeded 80 percent of the SEI money managers during the same period.

Bob Howitt, First Manhattan's Grumman portfolio manager, said his company aims for steady growth and the preservation of capital over a three- to five-year cycle.

"The type of performance we've had in our short period as equity fund manager is very typical of our 15- to 20-year history," he said. "Namely, if the market was down, we did somewhat better. For the first quarter of this year, with unaudited data, we're up about 18 percent against 21 percent for the market overall. Underperforming a very strong market is countered by outperforming a down market."

The fixed income fund also outperformed its SEI median in 1986, offering a 15.7 percent return. (The SEI median was 14.7 percent.) Over the last five years, investors in this fund have enjoyed a compound annual return of 18.2 percent. That beats two-thirds of the SEI bond managers over the same period.

Discussing the fund's outlook, Al Meddaugh, vice president of Fiduciary Trust, said low inflation and slow economic growth will continue worldwide. Historically, those factors have worked to bond investors' favor.

"Interest rates over the next few years will continue to come down," said Meddaugh. "That's mainly due to the U.S. inflation rate grinding down. We see a volatile market, one in which quality bonds are available for us to buy, and continued capital

gains — though returns will probably be somewhat lower than those we've seen over the last few years."

With a rate of 11.3 percent in 1986, the guaranteed income fund well outperformed money market funds and three-month Treasury bills. Those two types of investments dropped from an average return of seven percent at the beginning of the year to under six percent at year-end.

In 1986, Grumman contracted two more insurance companies to manage portions of the fund. Those firms are Home Life Insurance of New York City, and Principal Mutual Life Insurance of Des Moines, Iowa. They join Mutual Benefit Life, Aetna, and Manhattan Life. The fund's return is a blend of the rates offered by those five companies; the blended rate for 1987 is 11 percent.

Though it now accounts for \$327 million of the EIP's \$757 million, the guaranteed income fund has also experienced more transfers and withdrawals. Bradshaw expects that to change as the result of penalties imposed by the Tax Reform Act.

The company stock fund fluctuated considerably during the year, with high and low unit values differing over seven dollars a share. Overall, the fund closed 1986 at \$24.94, down from the year-end 1985 figure of \$31.38.

The company matching contribution continued to drop through 1986. In January, the match was 82 percent; at year-end, it was 58 percent. The match is tied to company profits, with a 50 percent floor and a 100 percent ceiling.

The match had held at 100 percent through 1985, but with profits down, has declined to its current level of 57 percent. Profits have been cut by fewer aircraft deliveries and the no-profit status of the F-14D and A-6F development contracts.

The EIP office is preparing a booklet outlining the 1986 results, which will include many of the charts presented at the meeting. It will be available next month, and requests must be in writing. To get a copy, write to: EIP office, mailstop C15-GHQ. ■

Any Questions?

After the EIP meeting, questions about the plan were fielded by Grumman Vice President and Secretary Bob Bradshaw, representatives of Grumman's EIP and Tax departments, and the funds' managers. The following are just a few of the issues that came up.

Why does it take so long to get the quarterly statements out?

"If all was working perfectly, the quarterly statements would be mailed by Bankers Trust 30 days after the close of the quarter," said Bradshaw. "Quite frankly, we've had trouble getting the payroll information to the bank. We apologize for the problem, and it will get better."

Is there any way to better know in advance what the rates will be when I transfer from one fund to another?

No. You are given your fund's value on the last day of business in

the month in which you made the change — the same applies for EIP withdrawals. This is true even if you fill out a transfer form at the beginning of the month.

The Grumman EIP cannot offer the same information resources as a Wall Street firm; it isn't supposed to. The EIP is a company savings plan, not a vehicle for making a killing on the stock market. It's set up for long-term savings, and it's intentionally difficult to move money constantly. You can move funds from one fund to another twice a year.

What ever happened to the EIP annual prospectus?

The SEC dropped its requirement for investment plans to submit a prospectus several years ago, so this costly report is no longer printed. Members can call the Investment Plan office, Ext. (111) 57250, to request plan summaries and details of the various funds' portfolios.

Life Can Be An Agonizing Waiting Game For Those Who Need Transplants

About 13,000 Americans race time waiting for organ transplants. While some people need cornea transplants, most wait for hearts, lungs and other vital organs that will save their lives. One-third will lose the race.

But two Grummanites in Milledgeville, Georgia, know what winning the race means. Harold Brown donated a kidney to his sister. Harold Sanders received a new heart from an anonymous donor.

During National Organ and Tissue Donor Awareness Week — April 26 to May 2, Americans will be asked to pledge their vital organs and to inform their relatives and family doctors that they want to be donors.

Harold Brown's reason for becoming a kidney donor was basic. "I did it for love," says Brown, who donated one of his kidneys to his sister last July. He is a leadman in Layup in Milledgeville Operations.

"We could tell Glenda wasn't well," he says. "She was losing weight. Last April, when the doctors at the Emory University Hospital in Atlanta found out that she had a kidney infection, she became a transplant candidate."

When his sister approached family members, everyone jumped at the chance to help her. Brown was the first to pass the physical.

In June, his sister had both kidneys removed. The transplant operation was scheduled for July 22.

"The night before, we sat in the room and talked about how the future would be," Brown says. "The next morning, they rolled her in right beside me. It was a good feeling being there beside her."

Today, both lead normal lives, though she must take anti-rejection drugs for the rest of hers. "I get a lot of satisfaction seeing her walking around," he says.

Glenda Brown Dunn was lucky. She didn't have to wait for a donor. Harold Sanders did.

"You don't know what the wait is," says Caren Sanders of the ordeal she and husband Harold endured early last year. "You don't know when the end will be."

Harold's heart had been irreparably damaged by two heart attacks. He was put on the transplant waiting list at the University of Alabama Hospital in Birmingham.

While waiting for a heart, Sanders moved into an apartment

near the hospital. "They gave me a radio beeper, in case they found a donor," he says.

Meanwhile, his wife worked in Milledgeville during the week and spent the weekends in Birmingham. For six weeks they waited.

"Two weeks before the transplant I saw him really deteriorate," she says. "I told myself, 'He's not going to make it.' " Then, on February 24, 1986, a donor was found.

Today Harold is trim, has a spring in his walk and is working full time. He knows little about the donor. "He was from Columbia, South Carolina, and was 35 years old," says Sanders. "I keep referring to the person as 'he,' but I don't even know that for sure. I can't repay 'him.' But I speak before different groups to try to convince them to become donors. A lot of other recipients do the same."

Bonnie Jacobs-Hudon of the Atlanta Regional Organ Procurement Agency says, "If we could get kidneys from 4,000 donors, it would eliminate the waiting list for kidneys."

Checking off the donor box on your driver's license isn't enough. "Only one in five are detected at



A Waiting Game. A heart transplant saved the life of Harold Sanders. He was one of the lucky ones. His wait for a heart was eight weeks. Some people wait 20 weeks or more. Some don't live long enough for a donor to be found. National Organ and Tissue Donor Awareness Week, which is next week, seeks to get more Americans to become vital organ donors.

the time of a traffic accident. And even with the donor checkoff, here in Georgia we'll ask for family consent," says Jacobs-Hudon.

It's important that family members decide ahead of time to become donors and make that decision well known. It takes

pressure off the surviving family if tragedy strikes.

"We know there had to be a husband or wife or mother or father who had to make the decision to donate the heart to Harold," Caren says. "I can't thank them enough for making that decision."■

Grummanites Help NYC High School Engineer A High-Technology Curriculum

It's been in the news over and over again: American schools don't make the grade in science and technology. Now, two Grummanites are helping Andrew Jackson High School in Queens, New York, strengthen its curriculum.

Ed McKearney, Personnel Liaison representative in Building 106, Melville, and Ted Romer, assistant to the director of the Engineering Development Center in Bethpage, are advising the school on what should be included in its new science and engineering program. It will begin in the fall and will enroll about 700 of the school's 2,500 students.

Andrew Jackson High School contacted Grumman for advice after the company created its Partners in Education/Industry program last fall. The program encompasses a variety of projects to aid Long Island schools, including tours, lectures by company employees, and after-school tutoring. It aims to develop a better educated area labor force.

"As the program is now laid out, students will take introductory courses in their sophomore year, more advanced courses in their junior year, and college-level engineering in their senior year," says McKearney. "The program will enable students to better prepare for

college and careers. Students will also have an alternative to commuting long distances to one of New York City's science high schools."

The two Grummanites recently outlined for school administrators and teachers the skills Grumman requires of prospective employees. They also gave them a rundown of Grumman's computer networks, manufacturing technologies, and engineering projects. The Grummanites said schools need to better keep pace with technological

change.

"That means constantly updating the concepts they teach and the equipment they use," says Romer. "The schools also need to better teach how new technology develops into products."

The Grummanites also recommended better technical writing courses. "I've seen a weakness among engineers in expressing themselves in writing," says McKearney. "They assume readers have the same knowledge, but that's not always the case."■



Industry View. Ed McKearney (L) and Ted Romer (above) advised Andrew Jackson High School on what should be included in its new engineering program. (Photos by Bob Settles)

Correction

On page 1 in the April 10 issue of *Grumman World*, Ken Smith of the Publications Dept. was shown working on a computer screen. An X-29 was displayed on the screen, not an EA-6B crimping tool.

Shop Talk From McGrath:

'When We Tie All Our Manufacturing Operations Together, The Grumman Team Will Be Tough To Beat'

In Tom McGrath's old office, a metal sculpture of a sailing vessel hung on the wall opposite his desk for several years. However, one thing about that metal sculpture always annoyed McGrath — the flags on top of the three masts are flying in the wrong direction. "I have to fight the urge to bend them the correct way," said McGrath.

Getting things in order is one of Tom McGrath's attributes — and one that will be tested in his new assignments. A few weeks ago, he was elected vice president-Aircraft Modifications and Subcontracts for Grumman Corporation.

Aerostructures Division President Don Schlegel and St. Augustine Division President Joe Walter report directly to McGrath.

Commenting on this new arrangement, Grumman President John O'Brien said, "Aerostructures and St. Augustine will remain separate divisions, continuing our policy of addressing diverse market needs. However, since these divisions do share certain market segments, this move will increase our effectiveness in meeting our customers' requirements."

At the same time, McGrath was also appointed senior vice president-Product Operations for the Aircraft Systems Division. In this job, he is responsible for Bethpage, Calverton, Milledgeville and Stuart Operations.

"Basically, this post is dedicated to making sure our products are delivered on time inexpensively," said Aircraft Systems President Renso Caporali. "In short, we needed someone for the 'inside job,' a person who makes sure all the trains run on time. It will take a lot of energy and enthusiasm."

There are many challenges facing Grumman's manufacturing team in the months ahead. Two new programs — the F-14D and the A-6F — are being phased into the production line. Structural and avionics changes are also in store for the EA-6B and the E-2C. In addition, major assembly subcontracts are also coming on line, such as the empennage for the V-22 Osprey tilt-rotor.

"We have to find better ways to do the job and minimize inefficiencies," said McGrath. "Learning curves are always impacted when a new program is introduced. Although we call the F-14 and A-6 mature programs, the 'D' and 'F' models reflect the most recent changes. When black boxes are moved, mounting structure added, hydraulic lines modified and wiring rerouted, there has to be some learning involved."

McGrath added, "The shop floor is where the action is at Grumman. We have to make sure people have the right tools, parts and time to do their jobs. The buck

'It's important to me that I spend time on the shop floor hearing what people have on their minds.'



stops in manufacturing. Even though the front-end schedule may slip, the delivery date rarely changes."

There is a common link among all the company's aerospace manufacturing centers. Bethpage makes parts for all the off-Long Island sites, while others supply assemblies to Bethpage and Calverton. McGrath is responsible for overseeing all aerospace manufacturing.

When he moved to his new office in corporate headquarters on April 8, he packed a gag gift he got from Grummanites in Building 4 several years ago. It was a two-foot white rocket, complete with a belt to strap the missile on his back and "Tom" painted in a shamrock. Buzzing around the shop floor was his trademark on a number of programs during his career, when

rocket became the first word of a two-word nickname.

"It's important to me that I spend time on the shop floor hearing what people have on their minds. You get a clear picture of the situation quickly when you talk to the people doing the job," said McGrath.

Over 11,000 people work in manufacturing at Bethpage and Calverton on Long Island; Milledgeville, Georgia; Glen Arm, Maryland; Stuart, Florida; and in the St. Augustine Division. Another 400 Grummanites work in Aerostructures in Melville, L.I.

St. Augustine is the company's dedicated aircraft overhaul and modification center. Meanwhile Aerostructures has a marketing and engineering function, but no manufacturing facility. Its work is

farmed out to Aircraft Systems' facilities and St. Augustine. "Both Aerostructures and St. Augustine have the potential to work closely together to get new work. Closer ties between the two will benefit both the company and its customers."

Grumman has been successful in winning many significant contracts. People in manufacturing not only produce aircraft for the U.S. Navy, but a number of major assemblies for subcontract customers. "Both demand our utmost attention," said McGrath.

He cited the ever-increasing burden on manufacturing companies to produce quality products efficiently, on time and within a tight budget. "The competition is cutthroat, and it shows no signs of relenting," said McGrath. "How well we handle today's tasks will play a strong role in shaping our future."

McGrath is aware of people's concern about the high cost of manufacturing on Long Island. He concedes that bidding for new work using Long Island pricing alone is less competitive. "Combine all our sites and we can be as competitive as anyone," added McGrath. "Other major aerospace companies are faced with problems of high cost of manufacturing. When we tie all our manufacturing operations together, the Grumman team will be tough to beat."■



Mass Of Machinery. Susan Hughes is setting up one of the IBM 3480 disk drives at the Data System's Holtsville Production Center on Long Island. Holtsville, which opened in 1985, is the hub of Data Systems' business computing operations. (Photo by Rich Breunig)



Business Notes

In the business portion of the meeting, shareholders reelected four directors to three-year terms on the board. They are: Kenneth Axelson, director of various corporations; Grumman Chairman Jack Bierwirth; Renso Caporali, president, Aircraft Systems Division; and John Sargent, former chairman of the board, Doubleday & Company. David Luke, chairman of the board, Westvaco Corporation, was reelected to a two-year term.

Shareholders also ratified an amendment to the corporation's by-laws. The amendment redefines when Grumman officers, directors, and others may be indemnified by the company against legal action. It was earlier approved unanimously by the Grumman board of directors, and follows a broadening of the applicable New York business law.

Many other companies have adopted similar measures. In today's legal climate, corporate directors have been sued by shareholders even if their business judgements were honest and in good faith. Additionally, liability insurance is becoming more expensive to obtain from insurance carriers. The new amendment provides protection to people representing Grumman.

O'Brien: 'A Spirit Of Renewal An

Over 900 gather in Bethpage's Building 4 hangar for Grumman's annual

Chairman Jack Bierwirth and President John O'Brien welcomed over 900 people to the hour-long annual meeting of Grumman shareholders, held in the Building 4 hangar in Bethpage on April 16.

Joining Bierwirth and O'Brien on the dais were Vice Chairmen Bob Freese and Dan Huebner, and Aircraft Systems President Renso Caporali. Other members of the board of directors and all the division presidents were also present.

During his report to the shareholders, O'Brien pointed out that Grumman has good reason to feel optimistic about the future.

"The Aircraft Systems Division, with its highly sophisticated electronics systems aircraft, remains our central business," said O'Brien. "We fully intend to maintain and improve our position as the world's foremost builder of tactical aircraft. We believe the way to grow is to apply that expertise to other electronic-system requirements. But the importance of Aircraft Systems to Grumman is undiminished."

In addition to the ongoing development work on both the F-14D and A-6F, O'Brien pointed out that this division is concentrating on the next generation of advanced early warning radar systems for the Navy. This effort is the basis for a proposal to the Air Force for a similar system currently called the Air Defense Initiative. "Test results for the Navy version were excellent," said O'Brien. "Both systems could be flight tested as early as 1991."

Later this year, Electronics Systems begins delivery of the U.S. Army's next generation of automated test equipment — intermediate forward test equipment (IFTE). The IFTE production program is estimated to be worth \$1 billion over the next decade — much more if the concept expands to other services, said O'Brien.

He announced that the Postal Service's first Long Life Vehicle rolled off the production line on April 15 at the recently expanded Montgomery, Pennsylvania, plant. "The LLV

will give Grumman new expertise in management systems, high-volume production methods, 'just-in-time' inventory and robotics."

O'Brien also briefed shareholders on several major company programs, such as Joint STARS, Data Systems work for Rolls-Royce in England, and Space Systems' development of a boost surveillance and tracking satellite — part of the Strategic Defense Initiative.

Grumman is awaiting word on several major proposals, added O'Brien. It is a member of two teams bidding on work packages for NASA's manned space station. Winners will be announced later this year. Grumman is also bidding on an \$800 million program support contract to assist NASA in managing the space station effort. TRW is the sole competitor. "If we are successful in winning this contract, we will establish a new division with the potential of employing 700 or more in the Washington, D.C./Virginia/Maryland area," said O'Brien. NASA will announce the winner in June.

He said that the company has made significant progress in international markets, especially in the Far East. Aerostructures recently signed a \$286 million contract with the Navy to modify S-2Ts for foreign sales. Meanwhile, Aircraft Systems is performing a preliminary study of an F-7 — basically a MiG-21 — for Pakistan. According to O'Brien, both projects offer a potential for significant follow-on business overseas.

He admitted that there were obstacles to Grumman's growth, adding that these areas are being addressed. The most serious challenge has been brought on by changes in government contracting.

"The defense budget is shrinking," said O'Brien. "As a result, future Department of Defense expenditures will support fewer yet larger programs. To win these programs, we must become the toughest competitor — in price and in execution — in an extremely competitive marketplace."

'Grumman Intends To Stay On L.I. — Forever'

During the 1987 annual meeting, Chairman Jack Bierwirth and President John O'Brien answered several questions asked by the shareholders. Also responding to inquiries were Mike Pelehach, who retired as president of Grumman International last October; and Rolf Larson, Grumman International President.

There is a widespread perception that Grumman is moving off Long Island. Is it true?

John O'Brien: "The company's \$600 million modernization here makes it obvious Grumman intends to stay on Long Island — forever. But in today's competitive environment, we must move some of our new programs off Long Island. That is what we have been doing — we have 25 percent of our people off Long Island already."

Jack Bierwirth: "To build the new Long Life Vehicle assembly plant on Long Island would have been very costly. With a high production rate, the plant requires a lot of land to park its inventory. Anybody on Long Island these days knows what land goes for per acre. It just doesn't make economic sense to buy that amount of land to use as a parking lot. Long Island will continue to be home to Grumman's core of engineering and aircraft-construction skills."

In looking at the pension fund, there is now some \$400 million over and above what is required by law as a cushion against a downturn in the market. Is there likely to be a further reduction in the corporate contribution to the pension fund, thereby increasing Grumman's earnings?

Bierwirth: "Grumman already has such a formula in place. Each year, the amount put into the fund is reduced by 20 percent of the excess — as of December 31 of that year. Over time, the annual contribution is substantially reduced."

"This measure is taken when stock and bond markets are bullish and there is a large cushion in the fund. If the markets all go down, the contribution is increased by the same factor. The first year the contribution went down, the reduction amount went to the research budget."

"Grumman has no plans of ever dissolving the fund, which has been done by other companies. That would be the wrong thing to do. The pension fund is part of our relationship with our retirees as well as employees."

Will there be either a one-time distribution to pensioners, or an increase in pension benefits?

Bierwirth: "There have been two ad-hoc adjustments to the pension: on December 1, 1980, and again on October 1, 1983. It worked like a reverse income tax: the further back the pensioner's retirement date, and the lower the annual pension payment, the larger the increase. In addition, from 1971 to 1986, pensioners received three percent annual cost-of-living adjustments. Pensioners can expect a 1.7 percent adjustment this year."

Is it wise for Grumman to work on the upgrade of the Russian MiG aircraft for the Pakistanis?

Mike Pelehach: "Pakistan is a U.S. ally that wants to modernize its air force. It has indicated interest in the F-16; however, it needs more than 200 aircraft, making that an expensive proposition. Pakistan thus seeks a U.S. firm to integrate American engines and avionics into the Chinese-built F-7M — a

version of the Soviet MiG-21. Assuming it's feasible, Pakistan could buy the upgraded F-7M for \$8 million — a fraction of what an F-16 costs."

"This could lead to a multi-billion dollar effort. There are several thousand airplanes like the MiG-21 in the Free World that are candidates for modernization. It would also strengthen U.S. ties to China."

I read an article about the Navy wanting to buy 500 Advanced Tactical Fighters. What's our chance of getting some of that business?

O'Brien: "We believe we have an excellent chance of getting into the ATF — if in fact they make the aircraft carrier-compatible. We also believe as the program develops there will be some rather large subcontracts. To become a prime contractor for the ATF would have required a huge investment on Grumman's part."

"At present, all discussions with the Navy about its requirements have been limited to the winners of the ATF competition. However, I don't think it will stay that way."



The Japanese say they want to team with a U.S. company to build a fighter aircraft. Since Grumman is doing a lot of marketing work in the Far East, what are our chances of going into a joint venture with the Japanese?

Bierwirth: "In an interview I gave to a Japanese paper, I said that Grumman would be delighted to be a junior partner. It's important to recognize that in building their own aircraft, the Japanese will retain total and final responsibility. But there are capabilities within Grumman — composites, electronics integration, and other experience — which would be helpful to them. There's no sense in their inventing things all over again."

Is there any truth to the recent speculation and rumors about Grumman being merged or taken over by another company?

Bierwirth: "Nothing I know of. I think that the battle we put up in the 1981 LTV takeover attempt pretty well convinced the corporate-raider types we aren't an easy shot. We've been proceeding on the basis that we are not an acquisition candidate. You can't spend the kind of research money we've spent in the last couple of years, and decrease your earnings the way we have, without creating a tremendous vulnerability — unless you feel you have the stockholders solidly behind you."

What's the status of our relationship with the Israelis on the Lavi fighter program? Is there any chance of additional work?

Rolf Larson: "We are a subcontractor for the wings and the tail. There has been some discussion regarding that role expanding, but until the U.S. and Israeli governments iron out their differences, we're right now just a subcontractor."



Regeneration'

eting of shareholders

The Defense Department has also imposed new contract terms and conditions; this has placed increasing financial burdens on defense contractors. O'Brien noted that it has been a tough transition, but Grumman and other contractors are adjusting to the new procurement environment. The company is being extremely selective of the jobs it pursues, said O'Brien.

Last year, Grumman had major difficulties with the F-14D and A-6F development programs. Early in 1986, it discovered certain technical problems which could significantly affect program costs and schedules. "These problems are nearing resolution," said O'Brien. In the meantime, Grumman is emphasizing cost controls and careful management of the development phase so the impact is minimal.

O'Brien also commented on the Navy's recently announced plans to reduce its purchase of F-14Ds and to buy remanufactured F-14As to make up for the shortfall. The F-14 remanufacturing job would be put up for competitive bidding. "Like all government plans that involve future procurements, and this one covers a 10-year period, the Navy's current plans are likely to change," said O'Brien. "We believe that it's in both the Navy's and Grumman's interest that the original planned procurement be maintained, and we are working vigorously toward that end."

"Grumman is experiencing a spirit of renewal," said O'Brien. "It is a process of regeneration that started some time ago — and one that is now beginning to pay off for us."

"Grumman benefits greatly from its long-standing reputation for quality and integrity," said O'Brien. "Our employees are loyal and committed. Our management is alert and flexible. We are endowed with engineering and technical skills which are more than equal to the increasingly complex technologies of tomorrow." ■



P. Aronna



S. J. Baldel



C. J. Benedict



S. M. Cines



W. C. Davis



J. R. Delaney



W. E. Diercks



M. V. Duffner



L. J. Dutil Jr.



W. E. Egner Jr.



J. F. Fogarty



S. W. Fuller



J. J. Galia



G. Y. Gardner



F. W. Gsell



B. Henderson



R. Helmer Jr.



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G. S. Sarinick



F. W. Schaeffer



M. Schreiber



F. A. Shanley Jr.

Service Milestones

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William H. Wandelt, Assemblies, Bethpage, Aircraft Systems

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George Adesso, Bldg. 215 Salisbury Prod. Supv., Great River, Electronics Systems
Salvatore Assenza, Assemblies, Bethpage, Aircraft Systems
Alvin G. Beyerlein, Prod. Bldg. Mgmt., Bethpage, Aircraft Systems
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Theodore A. Petters, F-14 Upgrade, Calverton, Aircraft Systems
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Theodore P. Pupilla, Prod. Bldg. Mgmt., Bethpage, Aircraft Systems
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Frank Sautkulis, Subassembly, Bethpage, Aircraft Systems
Paul Schlie, Air Traffic & Radio Comm., Calverton, Aircraft Systems

Daniel O. Schmidt, Final Assembly Struct., Bethpage, Aircraft Systems
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Robert Salg, Wing Inner Panel & Combo, Bethpage, Aircraft Systems
Frank Tucholski, Prod. Cont.—Maj. Assembly, Bethpage, Aircraft Systems
Henry K. Wuepper, Mach. Insp., Bethpage, Aircraft Systems

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Pasquale Aronna, Publications, Melbourne, Melbourne Systems
Seymour J. Baldel, ILS Supply Ops. Proj. Mgmt., Melville, Aircraft Systems



A. E. St. Jean



J. R. Tagliavia



J. J. Taxter Jr.



A. Trabold Jr.



J. R. Venero



S. Weinberg



P. West



H. A. Womble

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Jean GoetzHaddad, Mfg. Est. & Dev. Prod. Prog., Melville, Aircraft Systems
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Stephen Weinberg, Staff, Melville, Aerostructures
Phinixy West, Trans. Office—Div. Assign., Bethpage, Aircraft Systems
Harry W. Wilson, ILS Tech. Writing, San Diego, Aircraft Systems
Henry A. Womble, Electro/Mech. Des., Bethpage, Aircraft Systems
Albert F. Zoltke, Tel. Comm., Bethpage, Data Systems



The Big Picture. In Building 14, Bethpage, Dennis Buckland and Edmund Leung check a drawing of a gate array chip for the Adaptive Interference Blanker Unit. The blanker unit will be carried aboard the F-14D and A-6F. To prevent damage, it turns off the plane's receiver when the transmitter is operating in the same frequency range. This chip was the first one designed by Grumman's Very Large Scale Integration (VLSI) Design Center, where Buckland and Leung both work. You can't tell from this photo, but there are two layers of circuitry depicted: one in blue, the other in red. In production, the chip is 1/96 the size of the drawing. (Photo by Rich Breunig)

Retirees

On behalf of our fellow workers, *Grumman World* salutes the following Grummanites for their contributions to the company and wishes them well in their retirement. Those who have recently retired are:

William F. Zukoski (5), Louis Salvatorelli (121), Charles Wohl (110), Fred Dipetto (5), Oldrich Ulman (121), Henry C. Zembko (1), Albert E. Witzig (2), David Ruppel (35), Jean F. Steibel (GHQ), Virginia M. Skozlas (2), Miles C. Jones (6), George C. Lindstrom (6), Joseph A. Parisi (6), Theodore A. Petters (6), Anthony J. Rizzi (6), Walter H. Rumpel (6), Edward H. Seeley (6), John Leo Slokovitz (6), Matthew D. Taibi (6), William E. Dunstane (1), Rudolph P. Altmann (6), Frank Cipriani (6), Calvin C. Conrad (6), John J. Cortesse (6), Roman E. Czarniecki (6), Gottfried G. Eggart (6), Alfred C. Falkowski (6), Philip J. Gribbins (6), William S. Hounsell (6), Henry L. Fazzari (2), Edward C. Fink (1), Robert C. Fitzpatrick Sr. (GHQ), Jack L. Fox (35), George A. Fowler (2), Kenneth D. Gaynor (2), John J. Glozek (31), David S. Goodman (25), Frederick V. Housley (9), Robert A. Corrigan (2), Grace M. Accardi (1), Eugene J. Balfe (2), Philip Beilock (30), Anthony J. Bianco (3), Robert A. Burns (2), Jack E. Campbell (12), John P. Chacalos (3), Robert M. Edgerly (35), Carl P. Fagioli (3), George F. Rocchio (5), Murray Pittel (1), Helen J. Fogle (112), Clifford F. Barrett (6),

George A. Patterson (9), George G. Trotta (2), Dominick L. Quaresimo (2), Dominic A. Valenza (5), Adolph J. Vnook (2), Arthur W. Sampson (7), Woodrow Burden (1), Frank E. Bunce (35), Harry R. Parslow (2), George Smolen Jr. (121), Henry Ruppenthal (1), Robert R. Breslin (6), Rita S. Sudwischer (1), Herbert H. Ketcham Jr. (2), John J. Koberlein (2), Harry Koehler (2), Steve H. Lee (12), Thomas D. Mahon (GHQ), Frank W. Maier (3), Edward J. McGlade (30), John F. Miller (287), Donald J. Murphy (1), John L. Garelle (9), Charlotte L. Auricchio (3), Edward A. Beacon (2), Antonios Bezas (40), John D. DelGaudio (3), Harry J. DeMeo (2), Eugene Earley Jr. (2), Helen R. Greiff (35), Robert Hurtig (1), Anthony F. Ingoglia (1), Charles Wolchok (2), John H. Tiller (1), William E. Simpson (25), Vito Lenoci (123), Stanley J. Klima (2), Ralph W. Lehr (123), Richard L. Makemson (5), Robert W. Nash (7), James F. Rayall (2), Loretta Smith (1), Wesley T. Johnson (25), Charles L. Kalaghan (110), Gandolfo Messina (1), Alvin H. Kirschberg (3), Warren E. Schaller (5), Warren G. Smith (5), Thomas J. Cataldo (105), Joseph E. Morelli (2), William J. Majuk (112), Nicholas DiLeone (7), Donald Diebel (31), Abraham Davis (2), Salvatore A. Genna (1), Lawrence F. Laing (17), Marian Grasso (24), Alexander Gomza (35), Reginald E. Hooson (35), Anthony B. Antonucci (3), Edward J. Zarodkiewicz Jr. (30), Robert E. Greif (1), William C. Williamson (2), James Gatto (1), Michael Rocco (4), Edward

Cramer (2), Harold White Jr. (5), Anthony J. Mazzella (1), Edward A. Hansen (112), Jean Oakley (2), John E. Luttinger (2), Peter Balasko (2), Fred G. Theobald (5), Gloria H. Meinecke (5), Felix Latinski (5), Ludwig Schaefer (5), John Stefaniw (5), Robert Salerno (3), Erwin VonHoff (3), George Stephani (30), John J. Flatley (10), Robert Skolnick (1), Robert A. Selby (7), Roy G. Haynes (2), Albert L. Crevoiserat (1), Herbert J. Estes (66), William C. Burgermeister (7), William A. Knecht (1), Jacqueline A. Deasy (15), Salvatore J. Palazollo (30), Edward H. Drew (3), Edwin Anderson (35), Emanuel Arcuri (1), Jesse Archey (35), Agnes A. Atkinson (2), Thomas J. Cataldo (105), Florence L. Barker (14), Thomas F. Caputo (2), Salvatore Cannizzaro (1), Anthony R. Buscaglia (1), Samuel W. Brathwaite (2), Christy Farrell (2), Joseph T. Narkun (1), Rosario O. Negri (5), Katherine F. Rash (35), Marco A. Sompogna (2), Reuben P. Snodgrass (7), Adam T. Wolynski (2), Kenneth A. Bedell (21), Sima Miluschewa (35), Blanche Oakes (30), Vincent Parinello (31T), Bernard H. Waag (40), John A. Malenchek (2), George Stajk (2), Elwood L. Larson (2), Alexander J. McRae (25), Leslie J. Murrin (9), John J. Murphy (5), Dorothy Kouwenhoven (3), George Ciullo (2), Thomas S. Baylis (3), William F. Schneider (GHQ), John B. Mills (40), John Laundis (2), Robert W. Thompson (6), John A. Transue (6), Ralph Waters (6), Herbert Oldhoff Jr. (2), Bernard Morgenstern (2), Edmund Boguta (2), Thomas B. Richardson (6).

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'Quaking Aspen.' Al Janson used a Minolta 700 to take this autumn shot of a forest in northern Arizona. He is a graphics illustrator for Product Training, Aircraft Systems.



'Nibble, Nibble.' This rabbit was caught in the act by Cesar Marin in his backyard in Levittown, Long Island. Marin used a Canon AE-1. He is a template maker in the Template department, Aircraft Systems Division, Building 11.



Wait Until You See Them In Living Color

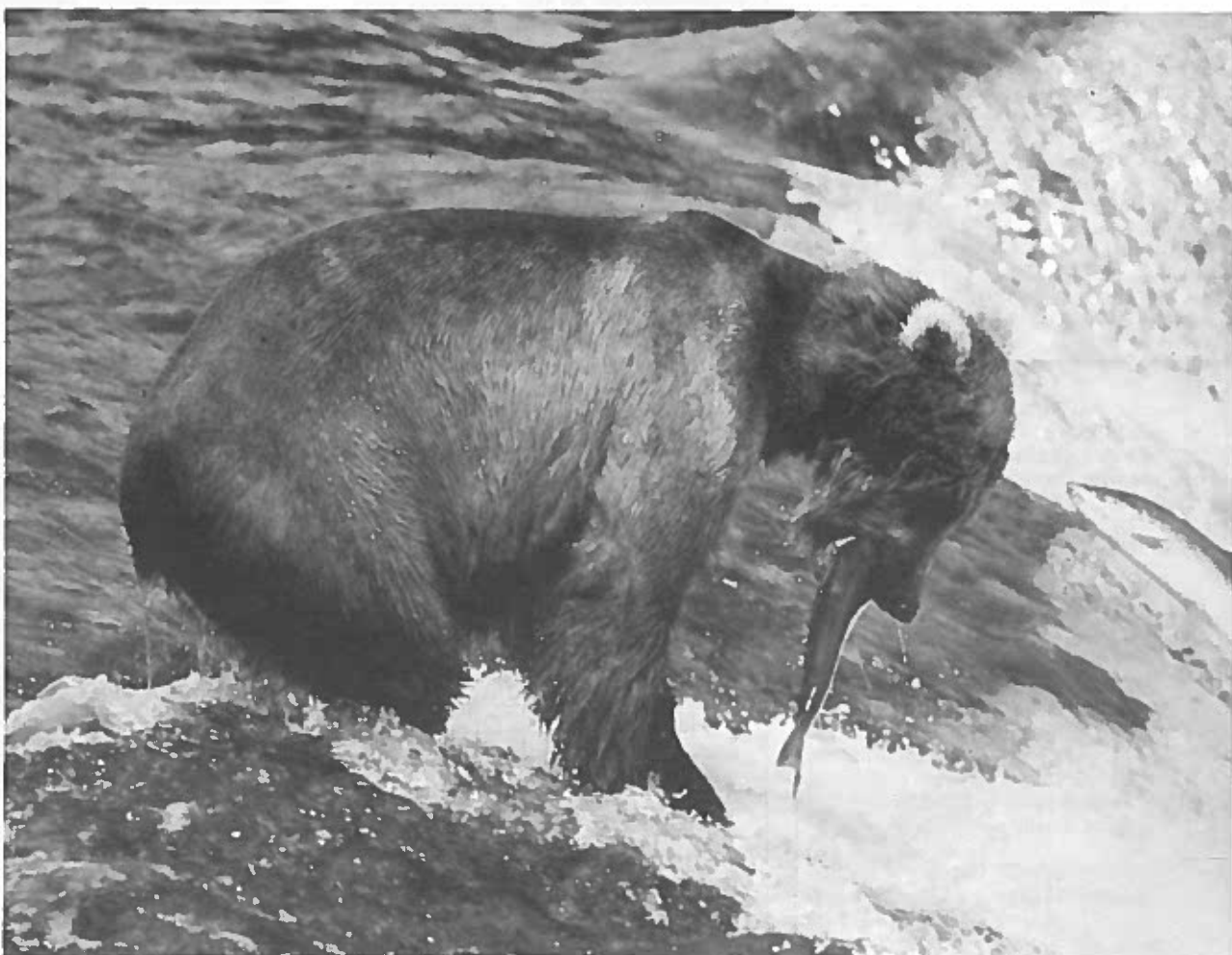
Thirteen talented shutterbugs won the 1987 Grumman Public Affairs photography contest.

The talented winners are Robert Amato, Paul Chiu, Richard DiScafani, Tony Germano, Herb Goldberg, George Hempel, Al Janson, Gerald Kraus, Jarvis Leng, Ralph Ladders, Cesar Marin, Edward Tory, and John Wagner.

Their colorful, winning entries will be enlarged to 20x30 inches, framed and then displayed in Corporate Headquarters for one year. Upon completion of the exhibit, the framed prints will be returned to the winners along with an 8x10 inch negative of the print.

Over 150 Grummanites entered the photography contest this year.

Wild Kingdom. Robert Amato took this picture (above) in Rome, Italy, with a Nikon FTN. He is an industrial specialist with the Naval Plant Representative Office. John Wagner used his Pentax camera to capture a seal up-close-and-personal (below) at Sea World in Orlando, Florida. Wagner is a senior marketing research analyst with Marketing Planning/Ops. Analysis, Corporate Services. While in Brooks Falls, Alaska, Ralph Ladders used his Olympus OM-2S to shoot this hungry brown bear (R). Ladders works in the Optics and Display Equipment Design department, Melbourne Systems Division.





Back To Nature. Richard DiScalfani got up early in the morning to capture these two fisherman (L) in South Haven, Long Island, with his Nikon FE-2. He is a planner in Production Control, Aircraft Systems Division. Jarvis Leng's winning photo (above) was taken at a pond in Cold Spring Harbor on Long Island with a Minolta SRT-101. Leng is a research scientist with Corporate Research, Aircraft Systems.



'Surfer.' Tony Germano, a traffic manager for the Naval Plant Representative Office (NAVPRO), used a Nikon FTN to catch this surfer in Florida.



'Flowering Gold.' Using a Minolta Maxima 700, Herb Goldberg took this photo of a bouquet he gave his wife for their anniversary. He works for NAVPRO.



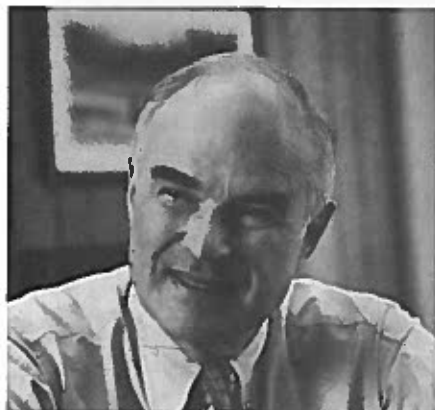
'Parrot.' While in Florida, Gerald Kraus took this photo in Parrot Jungle with his Canon F1. He works for Purchasing, Corporate Services.



People, Pets And Boats. George Hempel, an Aircraft Systems manufacturing engineer, used his Minolta SRT-202 to photograph this old rowboat (above) on the north fork of Long Island. Paul Chiu used his Canon T-90 camera to snap this photo of a woman (top L) in Somerset, N.J. He works as a software engineer for Requirements Analysis and Validation in Aircraft Systems. Edward Tory shot a photo (bottom L) of Tucky the dog in his backyard in Northport, Long Island, using his Canon AE-1 camera. Tory is a senior engineer in the Space Systems Division.



A Letter From The Chairman



Every year, when we mail out the annual report and the proxy statement to our shareholders, we include a blank card for shareholder comments. Every year, we get a few hundred back, with questions and comments and suggestions on everything imaginable.

This year, a number of our shareholders wanted to know, "Is Grumman leaving the aircraft business to go into electronics instead?" They are responding, I suppose, to recent articles about Grumman in newspapers and magazines, and also to the theme of our new advertising campaign and our annual report: "Look inside, and you'll think we're an electronics company."

Most of the shareholders who asked this question are Grumman people, and they sound truly concerned.

The only answer to this is, no — of course we're not going to stop building airplanes. In fact, this is stressed in our advertising and in our annual report. The aircraft business is the foundation of our

company; it is our history and our tradition.

But the electronics business is important to us, too. In fact, we hope that by the 1990s the electronics side will be just as strong and well established as the aircraft side. Today, 35 percent of the total defense procurement budget and 49 percent of the budget for research, development, test and engineering is for electronics.

Teamed with Northrop and Vought, we are competing to build the Advanced Tactical Aircraft. We will compete aggressively for all future aircraft work — but we must also take advantage of our other opportunities.

Throughout our history, we have prided ourselves not just on building superb aircraft, but on building into those planes the best airborne capabilities for the job.

In the '40s, Grumman was putting radar on Hellcats, turning them into night fighters. Later on, there were Guardians and Avengers, Panthers, Tracers, Trackers and Mohawks — and Grumman made a name for itself in antisubmarine, photoreconnaissance and airborne early warning aircraft. Today, Grumman aircraft have twice the electronic content of their counterparts anywhere in the world. We have integrated more different electronics systems into more different aircraft than any other company in the world. We've been at it for more than 40 years.

The electronics systems aircraft is a Grumman specialty; it remains our central business. We are

upgrading all four of our tactical aircraft. We're putting in new electronics systems that will enhance their performance and keep them in production for years to come. We have developed and expanded on this experience. We're installing sophisticated electronics in other airframes, as in the Joint STARS project. We have other programs, such as the Intermediate Forward Test Equipment for the Army and the Boost Surveillance and Tracking System for the Air Force, that are independent of aircraft.

Although Grumman people certainly know about our electronics savvy, not everyone else does. It's important that our shareholders understand that it is an area of significant growth. We want potential customers to know about it, too, so that our name comes to mind when they have an electronics contract to place.

Our capability in electronics doesn't take anything away from our aircraft business: it is part of it, and an extension of it. It makes the company stronger, more resilient, and provides a logical avenue for growth.

John C. Bierwirth
Chairman

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April 24, 1987

Airing The Results

A maze of ducts and pipes is required to cool the many electronic black boxes inside the next-generation F-14D Tomcat.

In Building 31, Bethpage, technician Bruce Hopkins (seated) and test engineer Peter Sutherland check the results of an air-flow test. Calibrated metal cans are placed where the black boxes would normally be, and the cooling system is turned on. Air pressure data is transmitted via plastic tubing to a computer system that calculates the air flow.

Each black box has a specification of the air flow required to keep it from overheating. Tests measure whether the ducting ensures the proper flow. In all, about 30 pieces of ducting must be tested.

In this photo, the test is finished — when the cooling system is on, it is quite noisy and the Grummanites must don earphones.

(Photo by Bob Settles)

